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SEVERE LOCAL STORM WARNING AND EVENT SUMMARIES AVAILABLE IN AFOS

Preston W. Leftwich, Jr. and Lawrence C. Lee
National Severe Storms Forecast Center
Kansas City, Missouri 64106

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NOAA TECHNICAL MEMORANDA

National Weather Service
National Severe Storms Forecast Center

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TABLE OF CONTENTS

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by

Preston W. Leftwich and Lawrence C. Lee
National Severe Storms Forecast Center
Kansas City, Missouri 64106

ABSTRACT. Verification of severe local storm warnings issued by National Weather Service offices is performed at the National Severe Storms Forecast Center (NSSFC). In association with collection of issued warnings and event reports, two products are routinely disseminated nationally via the AFOS network. A summary of severe local storm event reports received during the previous 24 hours (CCCSTADTS) is prepared daily. Once each week, a summary (CCCSTAXXX) is prepared for each WSFO. This summary lists events and warnings processed during the previous week for all stations within the management area of that WSFO.

Routine review of these messages by local offices will facilitate both local compilation of storm data and quality control of information entering data bases maintained at the NSSFC. For the purpose of encouraging routine use of these AFOS products, this report describes their content, outlines their role in verification and offers aids for their decoding.

1. INTRODUCTION

As part of the national forecast verification program of the National Weather Service (NWS), the National Severe Storms Forecast Center (NSSFC) in Kansas City, Missouri performs verification of all severe local storm warnings issued in the United States (NWS, 1982). Increased needs for verification results by local, regional and national management has produced increased demands for timely

verification reports. This, in turn, has increased demands for timely, accurate and detailed compilation of warnings and severe local storm reports that are used in verification procedures. In order to both encourage interaction among persons involved in the verification efforts and facilitate quality control of the data bases, two products are routinely transmitted via the AFOS network. This report reviews the contents of these messages and discusses their role in the ongoing severe local storm warning verification program.

2. DATA COLLECTION

The first step in verification of severe local storm warnings is collection of both the issued warnings and the reports of events that will verify the need for warnings. Collection of warnings is accomplished almost entirely on a real-time basis via AFOS. Although reports of severe local storm occurrences are received from many sources, a high percentage of these are extracted from statements, warnings, observations, local storm reports, state weather summaries, etc., received via AFOS. Others are obtained from telephone conversations, letters and newspaper reports. Finally, the monthly summaries entitled "Storm Data and Unusual Weather Phenomena" (Form F-8) are consulted.

To qualify as a valid severe local storm event, and thus be included in the event data base, reports must clearly satisfy one of the criteria listed in Table 1. For logging purposes, two or more qualifying reports of the same type (Table 1) that are within 10 statute miles and 15 minutes of each other and in the same county will be considered as one event. However, tornadoes, officially observed severe convective wind gusts and events having associated extreme damage, injuries or fatalities will not be limited by the time and distance criteria. Note that funnel clouds are not included, and thus will not verify a severe local storm warning. If a range of convective wind gusts are reported, an average value is used. Examples of significant wind damage include: shallow-rooted trees pushed over, chimney damage, large tree limbs blown down, roof surfaces peeled back, and downed power lines. Only reports specifically stating the type of event, the geographical location and the time of occurrence can be assured of proper notation in the event data base.

3. SUMMARIES AVAILABLE VIA AFOS

The increased emphasis on severe local storm warning verification has led to increased reliability in data col-

TABLE 1
CRITERIA FOR SEVERE LOCAL STORMS

Tornado: funnel or circulation touching ground.

Hail: equal or greater than 3/4 inch (dime-size) in diameter.

Convective wind gusts of at least 50 knots (58 mph).

Significant wind damage from convective wind gusts.

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WOUSØØ KMKC 21Ø931
        NSSFC TORNADO AND SEVERE THUNDERSTORM REPORTS
      FOR Ø6CST SUN  NOV 2Ø   1983 THRU Ø6CST MON  NOV 21  1983
      EVENT    LOCATION                          REMARKS     (CST)TIME
   1 *TORN  SAN MATEO FL  (41 E GNV)                              1228
NONE
   2  TORN  TURIN GA  (25 SSW ATL)                               141Ø
TWO ROOFS BLWN OFF.  AUTOS DAMGD.
   3  TORN  1 N (CSG)CSG METRO ARPT GA  ( 1 N CSG)               135Ø
TWO INJURIES, TREES AND POWER LINES DOWN
   4 *TORN  COCOA FL  (12 SSE TIX)                             1417
NONE
   5 *TORN  16 W (VRB)VRB MUNI ARPT FL  (18 W VRB)             1318
NONE
   6  A275  35 NNE (ATL)ATLANTA INTL ARPT GA  (1 SW 2VM)       143Ø

   7  TORN  1 E QUINCY FL  (16 NW TLH)                         1525
NONE
   8  TORN  23 SSW (WRB)ROBINS AFB GA  (29 SSW MCN)            162Ø
NONE
   9  WNDG  4 W HAWKINSVILLE GA  (22 WNW Ø7J)                  165Ø
BARN AND UTILITY BLDG DMGD
  1Ø  WNDG  7 NE HAWKINSVILLE GA  (15 NW Ø7J)                  171Ø
CARPORT DAMAGED
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Figure 1. Example of product CCCSTADTS, which is transmitted daily via AFOS.

lection procedures. Even so, errors or omissions do occur. In such cases, corrections are vitally important if accurate verification is to be accomplished. Rapid corrections to warning or event data ensure proper credit in verification summaries, lessen the workload of the verification focal point at field stations, and reduce both duplication of effort and computer time required to maintain the data bases at the NSSFC. However, increasing automation of data base management has required constraints to be placed on the timeliness of acceptable corrections.

Two messages are routinely transmitted from the NSSFC via the Automation of Field Operations and Services (AFOS) network for the purposes of aiding both compilation of local warning and event histories and rapid correction of the NSSFC data bases. Both are national products (thus available to all stations) which contain verification data recently compiled at the NSSFC.

The first message, having an AFOS PIL heading of "CCCSTADTS" is transmitted daily prior to 1200 GMT. It summarizes all severe local storm reports that have been received in real time at the NSSFC during the previous 24 hours. Figure 1 is an example from November 21, 1983. The type of severe weather event is coded as shown in Table 2. Also included are event locations, times of occurrence, and any remarks describing damage or significant facts concerning the events. Reports are numbered chronologically. All times are given in Central Standard Time (CST). An asterisk (*) preceding an event indicates that it occurred within a valid severe local storm watch.

A second message, having an AFOS PIL heading of "CCCSTAXXX" (where XXX is the WSFO node identifier) is transmitted on Tuesday of each week prior to 1200 GMT. This message is composed of two sections. The first section is a summary of all severe local storm events noted and entered in real time into the NSSFC data base for all stations within the indicated WSFO's administrative area of responsibility during the previous week. The second section is a summary of all severe local storm warnings issued by stations in the indicated WSFO's administrative area during the previous week and processed at the NSSFC. Fifty-four of these messages are disseminated each week. An example is given in Figure 2. Occasionally, warnings will not be processed at the NSSFC during the week in which they are issued. In such a case, these warnings will be noted in "CCCSTAXXX" as soon as processing is completed.

TABLE 2
Contractions Used to Denote Severe Local
Storm Events in "CCCSTADTS"

TORN	Tornado (verified or reported)
WNDG	Significant wind damage
GSSS	Convective wind gust: SSS is gust speed in knots. Ex. GØ75 indicates gust of 75 knots.
ADDD	Hail and size: DDD is hail diameter in hundreths of an inch. Ex. A175 indicates hail of 1.75 (1 3/4) inches in diameter.

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WOUSØØ KMKC Ø81Ø59??SOU
 ATTENTION SAT

 SUMMARY OF SEVERE WEATHER REPORTED TO SELS
 FOR PERIOD  OCT 31 1983 NOV Ø6 1983
 DATE   TIME STATE/ RESP EVENT    LOCATION SOURCE OF RPT AZRAN RADAR
 MODAYR  CST  COUNTY WSO         LAT  LONG OFFICE/MSG/          SITE
                                 DGMN  DGMN
 11Ø183 143Ø TX 167 GLS TORNADO 2923 Ø9447 GLS/      WRNG ØØ9/ØØ5 GLS
 11Ø683 165Ø TX 491 AUS HAIL175 3Ø32 Ø9733 AUS/      WRNG Ø4Ø/Ø12 AUS

 ****THE FOLLOWING WARNINGS HAVE BEEN PROCESSED****
8311 1 GLS 1435 1535 3  48167 1
8311 6 BRO  93Ø 1Ø3Ø 5  48215 1
8311 6 BRO  95Ø 1Ø5Ø 5  48 61 1 48489 1
8311 6 BRO 1Ø5Ø 115Ø 5  48 61 1 48489 1
8311 6 BRO 1Ø55 1155 1  48 61 1
8311 6 AUS 17ØØ 18ØØ 6  48491 1
8311 6 AUS 1715 183Ø 6  48453 1 48 21 1
8311 6 AUS 1737 183Ø 5  48453 1 48 21 1
8311 6 AUS 183Ø 193Ø 5  48453 1

 GUST SPEED IN KT. HAIL IN INCHES  RANGE IN N. M.

 PREPARED BY NSSFC /KCMO.
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Figure 2. Example of product CCCSTAXXX transmitted weekly (for each WSFO area of responsibility) via AFOS.

TABLE 3
DECODING AID FOR WARNING INFORMATION IN CCCSTAXXX

Coded line from Fig. 2:

[a]

YYMMDD	WWW	HHMM	KKNN	T	SSCCCPP	SSCCCPP
831ØØ6	BRO	1Ø5Ø	115Ø	5	48Ø61Ø1	4848ØØ1

Code	Example	Meaning	Decoding Reference
YY	83	Year - 1983	
MM	11	Month - November	
DD	Ø6	Day - 6	
WWW	BRO	Brownsville, TX	FAA Station Identifiers
[b]HHMM	1Ø5Ø	Beginning time of warning	Table A.1
KKNN	115Ø	Ending time of warning	Table A.1
T	5	Type of warning (Severe Thunderstorm-Radar)	Table A.2
[c]SS	48	State number - Texas	[e]FIPS PUB 5-1
[d]CCC	61	County number - Cameron	[e]FIPS PUB 6-3
[d]PP	Ø1	Porton of county warned - Whole county	Table A.3

[a]Within-group blanks are equivalent to zeros.

[b]All times are Central Standard Time (CST). Conversion to other times are given in Table 1 of Appendix A.

[c]Up to six state/county groups (SSCCCPP) are allowed on each line. If more than six are needed, subsequent lines are used.

[d]Currently, most values of PP will be "1", indicating entire counties.

[e]Published by National Bureau of Standards. See References.

In order to reduce computer processing and transmission times, these messages are coded. Information contained in the first section is denoted as column headings across the top of the message. Among data included are month, day, year, time, state, representative WSO, source office and closest radar site in conventional notations. All times are CST. Additionally, the geographical location of each event is given both by latitude and longitude (degrees and minutes) and by azimuth (degrees) and range (nautical miles) from the nearest NWS radar site. Hail size and wind gusts are coded as in Table 2. States and counties are denoted by standard identifying numbers (NBS; 1970, 1979). The second section is coded as indicated in Table 3. Tables in Appendix A can provide additional aid in decoding of these summaries.

4. ROLE OF AFOS MESSAGES IN VERIFICATION EFFORT

Both messages discussed in the previous section are available for collection and review by all field offices connected via the AFOS network. If several versions[1] are simultaneously retained, personnel who work variable schedules can be assured an opportunity to review warnings and events while still familiar with a particular situation. Also, pertinent daily and weekly summaries can be compared. Such a procedure provides a convenient means of quality control of the national severe local storm data base, which is maintained at the NSSFC. Any corrections or additions to data concerning events other than tornadoes should be noted and mailed to the NSSFC[2]. Changes to information regarding tornadoes should be made only via the "Storm Data and Unusual Weather Phenomena" (Form F-8). Corrections or additions to warnings issued should also be mailed to the NSSFC, and must include a "hard copy" of each warning message. This copy is required for inclusion in the Warning Message File maintained at the NSSFC.

Significant improvements in verification data base contents can be achieved through routine review of both "CCCSTADTS" and "CCCSTAXXX" messages. Correct, timely and useful verification reports can result when initial severe

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[1] Retention of several versions can be accomplished by use of the "VERSION PURGE" option in the AFOS.

[2] Address: Verification Specialist, National Severe Storms Forecast Center, Room 1728, Federal Building, 601 E. 12th Street, Kansas City, Missouri 64106.

local storm reports and, in the cases of errors, corrections are forwarded to the NSSFC as soon as operationally possible. Additionally, information compiled from these AFOS messages will be helpful in preparation of "Storm Data and Unusual Weather Phenomena" (Form F-8) by local offices at the end of each month. Such a cooperative effort, coupled with frequent communication among all persons involved in verification, will be mutually beneficial.

5. RELATED AFOS PRODUCTS

The NSSFC compiles additional data concerning tornadoes and distributes them via two other AFOS messages. Tornado occurrences are tabulated by month and state in "CCCSTAMTS." Tornado events resulting in fatalities are documented in "CCCSTATIJ."

The following are brief descriptions of the contents of these two messages:

(1) CCCSTAMTS: The numbers of reports received in real time are listed in the column "ROUGH." Those tornadoes whose occurrences are confirmed by "Storm Data..." are listed in the column "SMOOTH." "NORM" refers to averages for the period 1950-1980. "KILLERS" gives the number of tornadoes causing fatalities. This message is updated daily.

(2) CCCSTATIJ: All times are Central Standard Time (CST). Reports are preliminary until confirmed by "Storm Data..." Columns A, B, C and D refer to fatalities that occurred in tornado watches, in severe thunderstorm watches, close to watches, or without a watch, respectively. In the "REMARKS" section, "WW" refers to the number of a severe local storm watch that was valid for the time and location of the tornado occurrence. This message is updated as required.

6. RELATED STUDIES

A study by Kelly and Schaefer (1982) documented characteristics of severe local storm warnings and verification statistics for the period 1976-79. Currently, the data bases are undergoing standardization to facilitate future statistical studies. Monthly and year-to-date verification summaries are provided to all regional headquarters and local offices. Verification procedures are constantly reviewed for possible improvements. Although they are not discussed here, these topics will be subjects of future reports.

7. SUMMARY

Recent increased emphasis on verification by management has produced increased demands for timely verification reports. Two messages that are routinely transmitted via AFOS can be helpful. These messages summarize, on a daily and weekly basis, the warnings and event reports that have been collected by the NSSFC and included in verification data bases. Review of these messages by local offices and rapid receipt of any needed changes by the NSSFC can help to assure that warning verification for field stations is both timely and accurate. Also, these summaries can aid development of local or regional storm histories.

8. ACKNOWLEDGEMENTS

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9. REFERENCES

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National Weather Service, 1982: National Verification Plan. U.S. Dept. of Commerce, NOAA, 81 pp.

APPENDIX A

Table A.1 TIME CONVERSION

GMT +0	EDT +4	CDT EST +5	MDT CST +6	PDT MST +7	PST +8
0000	2000	1900	1800	1700	1600
0100	2100	2000	1900	1800	1700
0200	2200	2100	2000	1900	1800
0300	2300	2200	2100	2000	1900
0400	0000	2300	2200	2100	2000
0500	0100	0000	2300	2200	2100
0600	0200	0100	0000	2300	2200
0700	0300	0200	0100	0000	2300
0800	0400	0300	0200	0100	0000
0900	0500	0400	0300	0200	0100
1000	0600	0500	0400	0300	0200
1100	0700	0600	0500	0400	0300
1200	0800	0700	0600	0500	0200
1300	0900	0800	0700	0600	0500
1400	1000	0900	0800	0700	0600
1500	1100	1000	0900	0800	0700
1600	1200	1100	1000	0900	0800
1700	1300	1200	1100	1000	0900
1800	1400	1300	1200	1100	1000
1900	1500	1400	1300	1200	1100
2000	1600	1500	1400	1300	1200
2100	1700	1600	1500	1400	1300
2200	1800	1700	1600	1500	1400
2300	1900	1800	1700	1600	1500

Table A.2 WARNING TYPE/BASIS CODES

1	Tornado/Radar
2	Tornado/Public Tornado Report
3	Tornado/Public Funnel Report
4	Tornado/Satellite Analysis
5	Severe Tstm/Radar
6	Severe Tstm/Public Report
7	Severe Tstm/Satellite Analysis

Table A.3 COUNTY PORTION WARNED

01	Entire County
02	East Half
03	West Half
04	North Half
05	South Half
06	Northwest Half
07	Northeast Half
08	Southwest Half
09	Southeast Half
10	Northwest Quarter
11	Northeast Quarter
12	Southwest Quarter
13	Southeast Quarter
14	Central
15	North Central
16	West Central
17	East Central
18	South Central